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(54) Title: APPARATUS AND METHOD FOR PREVENTION OF ACCIDENTAL ACTIVATION OF KEYS IN A WIRELESS COMMUNICATION DEVICE		
(57) Abstract <p>A wireless communication device has one or more predetermined patterns of key operation that are required to perform the function associated with the key. For example, activation of a power key on (114) a wireless communication device may be intentional or inadvertent. The wireless communication device requires activation of the selected key with a predetermined pattern of operation in order to qualify as an intentional act by the user. The predetermined patterns of operation may be varied in accordance with different conditions of the wireless communication device. The predetermined pattern of operation may require continuous activation for a predetermined period of time, multiple activation of the selected key within a predetermined period of time, simultaneous activation of multiple keys, sequential activation of multiple keys, or the like. The wireless communication device may also utilize a display to request confirmation by the user of a selected action.</p> <div> </div>		

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APPARATUS AND METHOD FOR PREVENTION OF ACCIDENTAL ACTIVATION OF KEYS IN A WIRELESS COMMUNICATION DEVICE

BACKGROUND OF THE INVENTION

5

I. Field of the Invention

The present invention is related generally to a wireless communication device and, more particularly, to an apparatus and method
10 for preventing the accidental activation of keys in a wireless communication device.

II. Description of the Related Art

15 Wireless communication devices, such as cellular telephones, are widely used as replacement for conventional telephone systems. Wireless communication devices offer the advantage of portability and the ability to communicate from almost any location on earth. Early wireless communication devices were large and heavy and were not widely used as a
20 replacement for conventional telephones. However, improvements in technology have resulted in the reduction in size and weight while at the same time improving the quality and reliability of wireless communications.

State of the art wireless communication devices are small
25 enough to fit in the pocket of a user. Storing the wireless communication device in such a location may result in the inadvertent activation of keys on the wireless communication device. This is particularly problematic with the power key where inadvertent activation may turn the wireless communication device on or off without the user's knowledge. Therefore,
30 it can be appreciated that there is a significant need for a wireless communication device and method of operation that prevents the accidental activation of keys on the wireless device. The present invention provides this and other advantages, as will be illustrated by the following description and accompanying figures.

35

SUMMARY OF THE INVENTION

An exemplary embodiment of the present invention is directed to a system to prevent accidental activation of a key in a wireless communication device. The system comprises a housing containing the operational circuitry of the wireless communication device, a plurality of keys operable by the user to control operation of the wireless communication device, and a control circuit to sense activation of a selected one of the plurality of keys. The control circuit generates an indicator signal in response to activation of the selected key with a first pattern of operation that enables the operation of a function associated with the selected key. The control circuit is unresponsive to activation of the selected key with a second pattern of operation different from the first pattern.

Different patterns of operation may be acceptable and correspond to the first pattern of operation of the key. These include continuous activation of the selected key for a predetermined period of time, repeated activation of the selected key a predetermined number of times within a predetermined period of time, initial activation of the selected key and activation of the selected key at a subsequent time period. The subsequent time period may be a single point in time, or may comprise a time window during which the selected key must be in the active state. In one embodiment, the key must be at least momentarily in the active state within the required time window.

Other patterns of operation that correspond to the first pattern of operation can include sequential activation of the selected key and a second one of the plurality of keys within a predetermined period of time. For example, the selected key can be activated initially followed by activation of a second one of the plurality of keys within the predetermined period of time. Alternatively, the first pattern of operation may require simultaneous activation of the selected key and a second one of the plurality of keys.

In yet another alternative embodiment, the wireless communication device includes a display coupled to the housing to display text messages. In this embodiment, the first pattern of operation requires activation of the selected key and the activation of either the selected key or a second one of the plurality of keys on the key pad following the display of a confirmation request message on the display.

In another alternative embodiment, the wireless communication device includes a cover member attached to the housing and having opened and closed positions. In this embodiment, the first

pattern of operation when the cover member is in the open position is different from the first pattern of operation when the cover member is in the closed position.

5 **BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1A is a perspective view of a wireless communication device designed in accordance with the principles of the present invention in a closed configuration.

10 FIG. 1B is a front plan view of the wireless communication device of FIG. 1A in an open configuration.

FIG. 2 is a functional block diagram of the wireless communication device of FIGS. 1A and 1B.

15 FIG. 3 is a timing diagram illustrating an acceptable predetermined pattern of key activation used by the wireless communication device of FIG. 2.

FIG. 4 is a timing diagram of an alternative acceptable predetermined pattern of key activation used by the wireless communication device of FIG. 2.

20 FIG. 5 is a timing diagram of another alternative acceptable predetermined pattern of key activation used by the wireless communication device of FIG. 2.

25 FIG. 6 is a timing diagram of yet another alternative acceptable predetermined pattern of key activation used by the wireless communication device of FIG. 2.

FIG. 7 is a timing diagram of yet another alternative acceptable predetermined pattern of key activation used by the wireless communication device of FIG. 2.

30 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

35 Compact wireless communication devices often include a protective member over the keypad to prevent accidental operation of the keys. Accidental activation of the power key is prevented if the power key is also covered by the protective member. However, the disadvantage of covering the power key is that the user must open the wireless communication device to activate the power key. In an exemplary embodiment of the present invention, the power key is exposed to

advantageously provide access to the user on a continuous basis and techniques are provided to prevent accidental activation of the power key.

An exemplary embodiment of the present invention is illustrated in FIGS. 1A and 1B where a wireless communication device 100 is shown in a closed configuration in FIG. 1A. The wireless communication device 100 includes a housing 102 sized to fit easily in one hand of the user. The housing 102 includes a rotatable cover member 104. A battery housing 106 is attached to the cover member 104. A clasp 108 locks the battery housing 106 to the cover member 104 to retain the battery housing in position.

An antenna 112 projects from a top portion of the housing 102. In an exemplary embodiment, the antenna 112 is fixed. Alternatively, the antenna 112 may be extendible from the housing 102. Also included in the top portion of the housing 102 is a power key 114. The power key 114 is activated to turn the wireless communication device on and off. The advantage of locating the power key 114 on the outside portion of the housing 102 is that the wireless communication device 100 may be readily activated by the user without having to open the cover member 104 or the bottom cover member 106.

FIG. 1B illustrates the wireless communication device 100 in an open configuration with the cover member 104 in an extended operational position. An electrical switch (not shown) senses the position of the cover member 104 in the open and closed configurations. When the wireless communication device 100 is in the open configuration, a keypad 118 is exposed for operation by the user. The keypad 118 comprises individually numbered keys 120 that correspond to keys on a conventional telephone as well as control keys, such as a SEND key 122 and an END key 124. The keypad 118 may also include selection keys 126 to permit the user to select various operational features of the wireless communication device 100.

In an exemplary embodiment, the wireless communication device 100 also includes a display 130, which is exposed for viewing by the user when the wireless communication device is in the open configuration. A speaker 132 and microphone 134 are conventional components that allow two-way wireless communication.

A hinge member 138 is coupled between the cover member 104 and the housing 102 to permit the rotational movement of the cover member. In an exemplary embodiment, the hinge member 138 includes an internal spring element (not shown) to bias the cover member 104 into the

desired position in both the open configuration and the closed configuration (see FIG. 1A).

Additional components of the wireless communication device 100 are illustrated in a functional block diagram of FIG. 2. The wireless communication device 100 includes a central processing unit (CPU) 150, which controls operation of the wireless communication device. A memory 152, which may include both read-only memory and random access memory, is used to control the operation of the CPU 150. A portion of the memory 152 may also include nonvolatile random access memory. As will be described in detail below, the CPU 150 executes instructions from the memory 152 to function as a control circuit to sense operation of the power key 114 and keypad 118 and to detect operation of the keys in a manner that indicates that the user intends to activate a selected key.

A timer 154 is used by the wireless communication device 100 to measure predetermined time periods. The timer 154 may be an internal timer within the CPU 150 or an external timer under control of the CPU.

A transmitter 156 and receiver 158 allow transmission and reception of data, such as audio communications, between the wireless communication device 100 and a remote location, such as a cell-site controller (not shown). The transmitter 156 and receiver 158 may be combined into a transceiver 160. The antenna 112 is coupled to the transceiver 160.

A battery 162 is located within the battery housing 106 (see FIG. 1A) and provides power to the wireless communication device 100. In an exemplary embodiment, components such as the CPU 150, memory 152, timer 154, transmitter 156 and receiver 158 are disconnected from the battery 162 when the wireless communication device 100 is turned off. Thus, no power is consumed by the wireless communication device when it is turned off. In one embodiment, power is supplied to the CPU 150 and memory 152 upon initial activation of the power key 114 by the user. The CPU 150 executes instructions stored in the read-only memory portion of the memory 152 to initialize the CPU. The CPU 150 then executes a series of instructions designed to determine whether the user is activating the power key 114 in a manner that indicates the user's intent to turn on the wireless communication device 100. The steps taken by the CPU to determine whether the user intends to turn on the wireless communication device 100 will be discussed in detail below. If the CPU 150 determines that the user intends to turn on the wireless communication device 100, the other portions of the wireless communication device, such as the transmitter 156,

receiver 158, keypad 118, and display 130 may then be coupled to the battery 162. If the CPU 150 determines that the power key 114 was inadvertently activated, the wireless communication device 100 powers down the CPU 150 and memory 152. Alternatively, power can be applied to all portions of the wireless communication device 100 upon initial activation of the power key 114. The CPU 150 performs the steps described above to determine if the user intends to turn on the wireless communication device. If the CPU 150 determines that the user intends to turn on the wireless communication device 100, all portions of the wireless communication device are advantageously under power. However, if the CPU 150 determines that the power key 114 was inadvertently activated, the wireless communication device 100 powers down all components, including the CPU 150 and memory 152.

In yet another alternative embodiment, the battery may provide power to some portions of the wireless communication device 100 on a continuous basis. For example, the CPU may be placed in a low-power or "sleep" mode to minimize power consumption from the battery 162. The power key 114 serves as an input to the CPU 150 to place the CPU in an "awake" mode. When the user initially activates the power key 114, the CPU 150 changes from the sleep mode to the awake mode and executes the instructions to determine whether the user actually intends to turn on the wireless communication device 100. If the CPU 150 determines that the user intends to turn on the wireless communication device, the remaining portions of the wireless communication device 100 may then be coupled to the battery 162 in the manner described above. If the CPU 150 determines that the power key 114 was activated inadvertently, the CPU returns to the sleep mode.

The various components of the wireless communication device 100 are coupled together by a bus system 166, which may include a power bus, control signal bus, and status signal bus in addition to a data bus. However, for the sake of clarity, the various buses are illustrated in FIG. 2 as the bus system 166.

A conventional wireless communication device allows activation of power key simply by depressing the power key. However, such operation can lead to accidental activation of the power key. The present invention is designed to sense user activation of the power key 114 and will only respond to user activation of the power key under a predetermined set of conditions.

In an exemplary embodiment, the user must activate the power key 114 for a predetermined period of time before the wireless communication device 100 responds to activation of the power key. This is illustrated in FIG. 3 where the wireless communication device 100 detects
5 initial activation of the power key 114 at a time designated as t_0 . The wireless communication device 100 continues to monitor the state of the power key 114 until a predetermined time designated in FIG. 3 as t_1 . If the power key 114 is continuously activated for the entire time period between time t_0 and time t_1 , the wireless communication device 100 responds to the
10 activation of the power key. In an exemplary embodiment, the wireless communication device 100 may require continuous activation of the power key 114 for a period of three seconds. The continuous activation of the power key 114 for time period from time t_0 to time t_1 illustrates a first pattern of operation of the key that is unlikely to result from inadvertent jostling of
15 the wireless communication device 100 and serves as an indicator that the user actually intends to activate power key 114. A second pattern of operation, such as momentary activation of the power key 114 for a time less than the time period from time t_0 to time t_1 , is unlikely to be the result of intentional activation by the user and will thus be ignored by the wireless
20 communication device 100.

In the example of the first pattern of operation, illustrated in FIG. 3, the wireless communication device 100 continuously monitors the state of the power key 114 during the time period from time t_0 to time t_1 . In an alternative embodiment, illustrated in FIG. 4, the wireless
25 communication device 100 detects initial activation of the power key 114 at time t_0 and simply samples the state of the power key again at time t_1 rather than continuously monitor the state of the power key. The power key 114 has a first logic state when in an inactivated position and a second logic state when activated. If the power key 114 is activated (*i.e.*, in the second logic state) at the time t_1 , the wireless communication device 100 will respond to
30 user activation of the power key.

In another alternative embodiment, illustrated in FIG. 5, the wireless communication device 100 detects initial activation of the power key 114 at time t_0 . Instead of continuously monitoring the state of the power
35 key 114, the wireless communication device 100 samples the state of the power key during a time window that follows the detection of the initial activation of the power key at time t_0 . The time window is designated in FIG. 5 by the references t_2 and t_3 . The start of the time window occurs at a predetermined time t_2 after initial activation of the power key 100 at time t_0

and ends at a predetermined time t_3 after initial activation of the power key. If the power key 114 is activated at the initial time t_0 and is in the active state at any time during the time window between time t_2 and time t_3 , the wireless communication device 100 responds to activation of the power key.

- 5 In an exemplary embodiment, the time window is approximately 200 milliseconds with the start of the time window, indicated by time t_2 , occurring approximately three seconds after the initial activation of the power switch 114 at time t_0 .

- Numerous alternative techniques may be used to detect the user's intent to actually activate the power key 114. For example, the wireless communication device 100 can monitor the state of the power key 114 and detect multiple activations of the power key within a predetermined time period. This is illustrated in FIG. 6 where the initial activation of the power key 114 is detected at time t_0 . In accordance with this embodiment of the invention, the user must activate the power key 114 a plurality of times between the initial activation at time t_0 and a predetermined time designated in FIG. 6 as time t_4 . In the example illustrated in FIG. 6, the user must activate the power key 114 three times within the predetermined time period between time t_0 and time t_4 , which may be, by way of example, a three-second time period.

- The various techniques described above and illustrated in FIG. 3 to FIG. 6 illustrate techniques used to determine when the user actually wants to activate the power key 114. The wireless communication device performs this task by detecting user operation of the power key in one of the predetermined patterns described above. Alternatively, other patterns of user operation of the power key 114 may be used satisfactorily with the wireless communication device 100. In addition, combinations of the different patterns of user operation may be used satisfactorily with the wireless communication device 100. For example, the CPU 150 may be programmed to recognize multiple different patterns of activity as acceptable. Continuous activation of the power key 114 for the predetermined period of time (e.g., three seconds) or activating the power key multiple times within the predetermined period of time may both be recognized by the CPU 150 as corresponding to an acceptable pattern of user operation of the power key. Accordingly, user operation of the power key in any combination of acceptable patterns of activity may be used by the wireless communication device 100.

In the exemplary embodiment of the wireless communication device 100 illustrated in FIGS. 1A and 1B, the power key 114 is located on the

top portion of the housing 102 and is thus continuously exposed for easy activation by the user. The various patterns of operation described above and illustrated in FIG. 3 to FIG. 6 may be used when the wireless communication device 100 is in the closed configuration, illustrated in FIG.

5 1A. However, an altered first pattern of operation may be used when the wireless communication device 100 is in the open configuration, illustrated in FIG. 1B. The electrical switch (not shown) coupled to the hinge member 138 is used to sense whether the wireless communication device 100 is in the open configuration or closed configuration.

10 The altered patterns of operation of the power key 114 reflect the fact that the user is actively using the wireless communication device 100 in the open configuration and likely intends to activate the power key 114. For example, momentary activation of the power key 114 at time t_0 , as illustrated in FIG. 7, may be used as the first pattern of operation when the
15 wireless communication device 100 is in the open configuration. Alternatively, the activation pattern illustrated in FIG. 3, requiring continuous activation from the time of initial activation at time t_0 to time t_1 , may be used, but with the time period being altered to reflect the fact that the wireless communication device is in the open configuration. For example,
20 the time period from time t_0 to time t_1 may be three seconds when the wireless communication device 100 is in the closed configuration (see FIG. 1A), while the time period from time t_0 to t_1 may be only one second when the wireless communication device is in the open configuration (see FIG. 1B). Similarly, the wireless communication device 100 can sample the state
25 of the power key 114 at a predetermined time t_1 after initial activation at time t_0 or using the time window from time t_2 to time t_3 as illustrated in FIG. 4 and FIG. 5, but with altered time periods to reflect that the wireless communication device is in the open configuration.

The wireless communication device 100 may also use the first
30 pattern of operation for the power key 114 to turn on the wireless communication device 100 and an altered first pattern of operation to turn off the wireless communication device. For example, if the wireless communication device 100 is in the open configuration (see FIG. 1B) only a momentary activation of the power key 114 may be required to turn on the
35 wireless communication device 100, as illustrated in FIG. 7. However, continuous activation of the power key 114 for a period of time, as illustrated in FIG. 3, may be required to turn off the wireless communication device 100.

The wireless communication device 100 illustrated in FIG. 1A exposes only the power key 114 in the closed configuration. However, alternative embodiments of the wireless communication device 100 may be employed in which other keys, such as the selection keys 126 (see FIG. 1B), may also be exposed. The predetermined first pattern of operation may require activation of more than one key, such as the power key 114 and one of the selection keys 126. Various patterns of operation that correspond to the accepted first pattern of operation may include simultaneous activation of the power key 114 and one of the selection keys 126 or the sequential activation of the power key 114 and the selection key 126 within a predetermined period of time.

The wireless communication device 100 may also generate a prompt requiring additional activation of one or more keys on the keypad 118 (see FIG. 1B and FIG. 2) to perform the desired function. For example, the wireless communication device 100 may use a prompt on the display 130 in response to an initial momentary activation of the power key 114, as illustrated in FIG. 7. The display 130 can be programmed to display a prompt requesting that the user activate the power key 114 or a specified one of the selection keys 126 to confirm that the wireless communication device 100 is being turned off. The first pattern of operation may require that the activation of the power key 114 or selection key 126 in response to the prompt occur within a predetermined time of the display of the prompt.

Other acceptable first patterns of operation are dependent on the position of the cover member 104. For example, assuming the wireless communication device 100 is turned on and is in the open configuration (see FIG. 1B), momentary activation of the power key 114 followed by closure of the cover member 104 within a predetermined period of time serves as an indication that the user intends to turn off the wireless communication device. Similarly, assuming that the wireless communication device 100 is turned off and is in the closed configuration (see FIG. 1A), momentary activation of the power key 114 followed by an opening of the cover member 104 within a predetermined period of time serves as an indication that the user intends to turn on the wireless communication device.

Thus, a number of different patterns of operation of the various keys on the wireless communication device 100 serve as satisfactory indicators of the user's intent to perform a particular function. While the examples above are directed to the use of the power key 114, it is clear that the principles of the present invention may be applied to the activation of other keys as well. For example, additions or deletions to prestored speed

dialing numbers within the memory 104 (see FIG. 2) may require the activation of keys with a predetermined pattern of operation, such as the simultaneous activation of keys, activation of keys in a sequential manner, or the like. Similarly, the principles of the present invention may be applied
5 to a wireless communication device that has all keys continuously exposed where the keys may be inadvertently activated.

It is to be understood that even though various embodiments and advantages of the present invention have been set forth in the foregoing description, the above disclosure is illustrative only, and changes
10 may be made in detail, yet remain within the broad principles of the invention. For example, a combination of different patterns of operation may serve as satisfactory indicators the user's intent to perform a particular function. In addition, different patterns of operation may be valid only at certain operational states of the wireless communication device 100. For
15 example, certain patterns of operation, or combinations of patterns of operation, may be used when the wireless communication device is initially turned on. Following completion of a call, one or more different patterns of operation may be used to turn the wireless communication device off. Thus, multiple patterns of operation, combinations of patterns of operation,
20 and state-dependent patterns of operation may be used by the wireless communication device 100. Accordingly, the present invention is to be limited only by the appended claims.

WE CLAIM

CLAIMS

1. A wireless communication device comprising:
2 a housing, sized to be held in a hand of a user;
a wireless communication circuit within the housing to
4 transmit wireless communications to a location remote from the wireless
communication device and to receive wireless communications from a
6 location remote from the wireless communication device;
an antenna coupled to the housing to transmit radio signals
8 generated by the wireless communication circuit and to detect wireless
transmissions from the location remote from the wireless communication
10 device;
a keypad coupled to the housing and having a plurality of keys
12 operable by the user to control operation of the wireless communication
device;
14 a cover member, attached to the housing and having open and
closed positions, the cover member concealing the keypad when in the
16 closed position to prevent accidental activation thereof, the cover member
exposing the keypad when in the open position to permit activation thereof;
18 a power supply within the housing and selectively activated to
provide power to the wireless communication device;
20 a power control mounted on the housing and continuously
exposed to permit activation by a user to turn on and turn off the wireless
22 communication device; and
a power control circuit to sense activation of the power control
24 and to generate an indicator signal in response to activation of the power
control with a first pattern of operation, the power control circuit being
26 unresponsive to a activation of the power control with a second pattern of
operation different from the first pattern, the indicator signal enabling
28 operation of the power supply.

2. The wireless communication device of claim 1 wherein
2 the first pattern of operation when the cover member is in the open position
is different from the first pattern of operation when the cover member is in
4 the closed position.

3. The wireless communication device of claim 1 wherein
2 the first pattern of operation requires continuous activation of the power
control for a predetermined period of time.

4. The wireless communication device of claim 3 wherein
2 the predetermined period of time when the cover member is in the open
position is different from the predetermined period of time when the cover
4 member is in the closed position.

5. The wireless communication device of claim 1 wherein
2 the first pattern of operation requires activation of the power control a
predetermined number of times within a predetermined period of time.

6. The wireless communication device of claim 1 wherein
2 the power control has a first state when activated and a second state when
not activated and the first pattern of operation requires initial activation of
4 the power control and requires that the power control is in the first state at a
predetermined time following the initial activation.

7. The wireless communication device of claim 1 wherein
2 the power control has a first state when activated and a second state when
not activated and the first pattern of operation requires initial activation of
4 the power control and requires that the power control is in the first state
between a first predetermined time following the initial activation and a
6 second predetermined time following the first predetermined time.

8. The wireless communication device of claim 7 wherein
2 the first pattern of operation requires that the power control is at least
momentarily in the first state between the first predetermined time
4 following the initial activation and the second predetermined time
following the first predetermined time.

9. The wireless communication device of claim 1 wherein
2 the first pattern of operation requires sequential activation of the power
control and a selected one of the plurality of keys on the keypad within a
4 predetermined period of time.

10. The wireless communication device of claim 9 wherein
2 the first pattern of operation requires sequential activation of the power

control followed by activation of the selected one of the plurality of keys on
4 the keypad within the predetermined period of time.

11. The wireless communication device of claim 1 wherein
2 the first pattern of operation requires simultaneous activation of the power
control and a selected one of the plurality of keys on the keypad.

12. The wireless communication device of claim 1, further
2 including a display coupled to the housing to display text messages and
wherein the first pattern of operation requires activation of the power
4 control and a activation of a selected one of the plurality of keys on the
keypad following the display of a confirmation request message on the
6 display.

13. The wireless communication device of claim 1 wherein
2 the power control circuit is responsive to activation of the power control
with a plurality of first patterns of operation, the power control circuit
4 generating the indicator signal in response to activation of the power control
with any of the plurality of first patterns of operation.

14. The wireless communication device of claim 1 having a
2 plurality of operational states wherein the power control circuit is
responsive to activation of the power control with a first pattern of
4 operation corresponding to each of the plurality of operational states, the
power control circuit generating the indicator signal in response to
6 activation of the power control with the first pattern of operation
corresponding to the operational state of the wireless communication
8 device.

15. A system to prevent accidental activation of a key in a
2 wireless communication device, the system comprising:
a housing containing the operational circuitry of the wireless
4 communication device;
a plurality of keys operable by the user to control operation of
6 the wireless communication device; and
a control circuit to sense activation of a selected one of the
8 plurality of keys and to generate an indicator signal in response to activation
of the selected key with a first pattern of operation, the control circuit being
10 unresponsive to activation of the selected key with a second pattern of

operation different from the first pattern, the indicator signal enabling
12 operation of a function associated with the selected key.

16. The system of claim 15, further including a cover
2 member, attached to the housing and having open and closed positions,
wherein the first pattern of operation when the cover member is in the
4 open position is different from the first pattern of operation when the cover
member is in the closed position.

17. The system of claim 15 wherein the first pattern of
2 operation requires continuous activation of the selected key for a
predetermined period of time.

18. The system of claim 15 wherein the first pattern of
2 operation requires activation of the selected key a predetermined number of
times within a predetermined period of time.

19. The system of claim 15 wherein the selected key has a
2 first state when activated and a second state when not activated and the first
pattern of operation requires initial activation of the selected key and
4 requires that the selected key is in the first state at a predetermined time
following the initial activation.

20. The system of claim 15 wherein the selected key has a
2 first state when activated and a second state when not activated and the first
pattern of operation requires initial activation of the selected key and
4 requires that the selected key is in the first state between a first
predetermined time following the initial activation and a second
6 predetermined time following the first predetermined time.

21. The system of claim 20 wherein the first pattern of
2 operation requires that the selected key is at least momentarily in the first
state between the first predetermined time following the initial activation
4 and the second predetermined time following the first predetermined time.

22. The system of claim 15 wherein the first pattern of
2 operation requires sequential activation of the selected key and a second one
of the plurality of keys within a predetermined period of time.

23. The system of claim 22 wherein the first pattern of
2 operation requires sequential activation of the selected key followed by
activation of the second one of the plurality of keys within the
4 predetermined period of time.

24. The system of claim 15 wherein the first pattern of
2 operation requires simultaneous activation of the selected key and a second
one of the plurality of keys.

25. The system of claim 15, further including a display
2 coupled to the housing to display text messages and wherein the first pattern
of operation requires activation of the selected key and a activation of a
4 second one of the plurality of keys on the keypad following the display of a
confirmation request message on the display.

26. The wireless communication device of claim 15 wherein
2 the control circuit is responsive to activation of the selected key with a
plurality of first patterns of operation, the control circuit generating the
4 indicator signal in response to activation of the selected key with any of the
plurality of first patterns of operation.

27. The wireless communication device of claim 15 having a
2 plurality of operational states wherein the control circuit is responsive to
activation of the selected key with a first pattern of operation corresponding
4 to each of the plurality of operational states, the control circuit generating
the indicator signal in response to activation of the selected key with the first
6 pattern of operation corresponding to the operational state of the wireless
communication device.

28. A method to prevent accidental activation of a selected
2 one of a plurality of keys on a wireless communication device, the method
comprising the steps of:
4 sensing activation of a selected one of the plurality of keys;
 generating an indicator signal in response to the activation of
6 the selected key with a first pattern of operation, and being unresponsive to
the activation of the selected key with a second pattern of user operation
8 different from the first pattern; and
 enabling operation of a function associated with the selected
10 key if the indicator signal is generated.

29. The method of claim 28 for use with a wireless communication device including a cover member having open and closed positions, wherein the first pattern of operation when the cover member is in the open position is different from the first pattern of operation when the cover member is in the closed position.

30. The method of claim 28 wherein the first pattern of operation requires continuous activation of the selected key for a predetermined period of time.

31. The method of claim 28 wherein the first pattern of operation requires activation of the selected key a predetermined number of times within a predetermined period of time.

32. The method of claim 28 wherein the selected key has a first state when activated and a second state when not activated and the first pattern of operation requires initial activation of the selected key and requires that the selected key is in the first state at a predetermined time following the initial activation.

33. The method of claim 28 wherein the selected key has a first state when activated and a second state when not activated and the first pattern of operation requires initial activation of the selected key and requires that the selected key is in the first state between a first predetermined time following the initial activation and a second predetermined time following the first predetermined time.

34. The method of claim 33 wherein the first pattern of operation requires that the selected key is at least momentarily in the first state between the first predetermined time following the initial activation and the second predetermined time following the first predetermined time.

35. The method of claim 28 wherein the first pattern of operation requires sequential activation of the selected key and a second one of the plurality of keys within a predetermined period of time.

36. The method of claim 35 wherein the first pattern of operation requires sequential activation of the selected key followed by

4 activation of the second one of the plurality of keys within the
predetermined period of time.

2 37. The method of claim 28 wherein the first pattern of
operation requires simultaneous activation of the selected key and a second
one of the plurality of keys.

2 38. The method of claim 28 for use with a wireless
communication device having a display to display text messages and
wherein the first pattern of operation requires activation of the selected key
4 and a activation of a second one of the plurality of keys on the keypad
following the display of a confirmation request message on the display.

2 39. The method of claim 28 wherein the step of generating
the indicator signal is responsive to activation of the selected key with a
plurality of first patterns of operation and generates the indicator signal in
4 response to activation of the selected key with any of the plurality of first
patterns of operation.

2 40. The method of claim 28 for use with a wireless
communication device having a plurality of operational states wherein the
step of generating the indicator signal is responsive to activation of the
4 selected key with a first pattern of operation corresponding to each of the
plurality of operational states and generates the indicator signal in response
6 to activation of the selected key with the first pattern of operation
corresponding to the operational state of the wireless communication
8 device.

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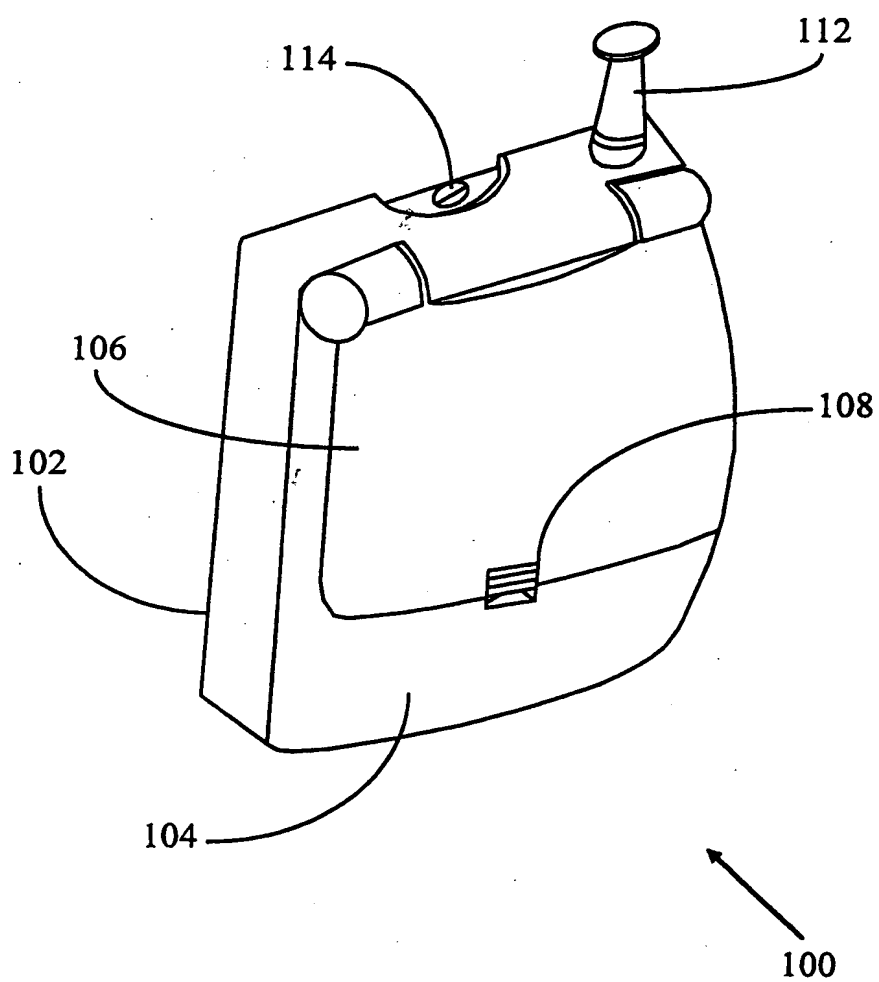


FIG. 1A

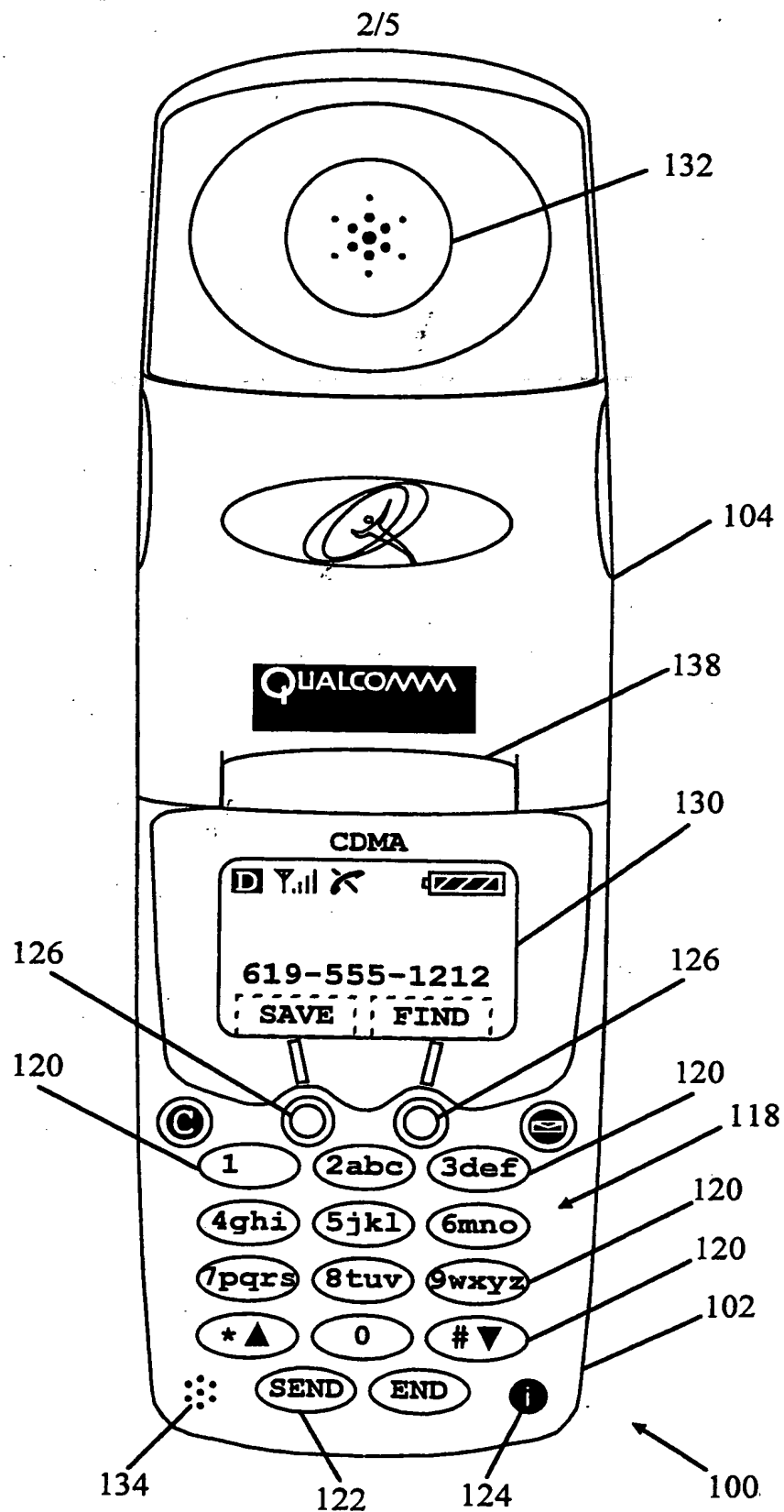


FIG. 1B

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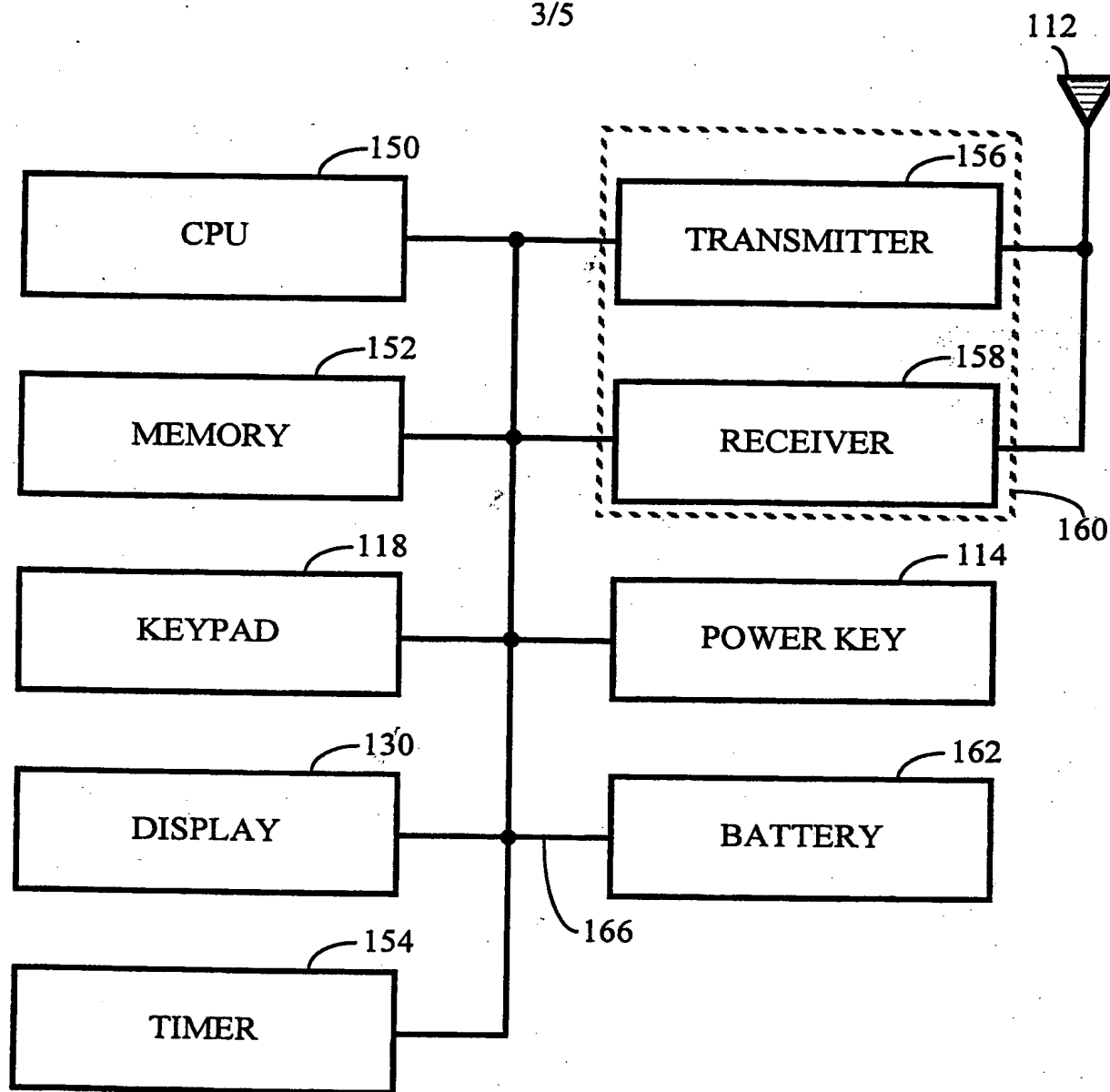


FIG. 2

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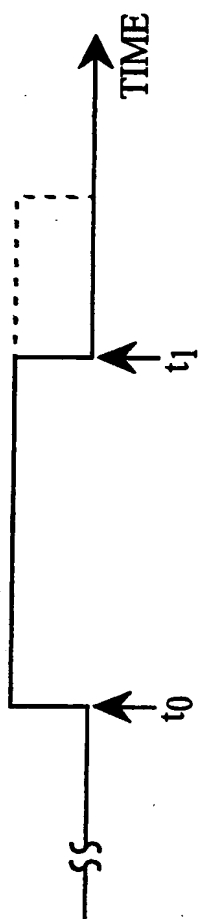


FIG. 3

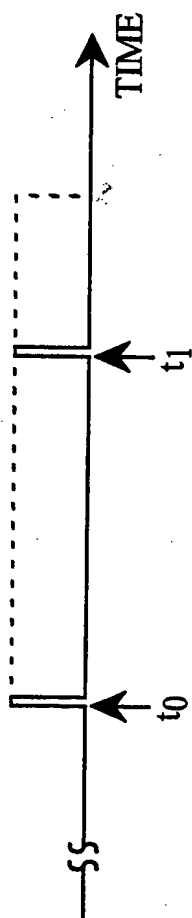


FIG. 4

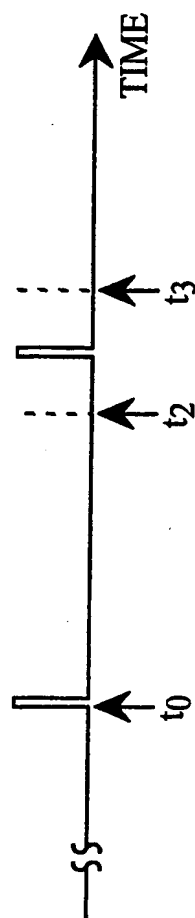


FIG. 5

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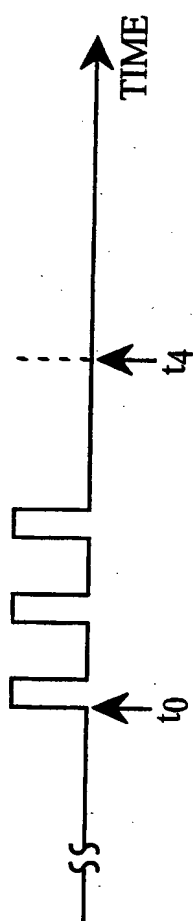


FIG. 6

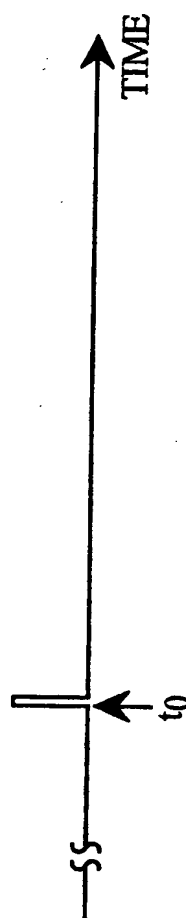


FIG. 7

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/US 99/01146

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04M1/72 H04M1/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04M H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 776 116 A (NOKIA MOBILE PHONES LTD) 28 May 1997 see column 1, line 1-17 see column 1, line 36 - column 2, line 33 see column 4, line 19-31 see column 5, line 42-56	15, 17, 22, 28, 30, 35, 36
A	---	1, 3, 9, 10, 12, 24, 25, 37, 38
X	US 5 247 565 A (JOGLEKAR MANOHAR A ET AL) 21 September 1993 see abstract; claims 1, 2	15, 24, 28, 37
A	---	11
	-/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

16 April 1999

Date of mailing of the international search report

29/04/1999

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INTERNATIONAL SEARCH REPORT

Inter. nal Application No
PCT/US 99/01146

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 31468 A (NOKIA MOBILE PHONES LTD ;CRISP MARTIN (GB)) 28 August 1997 see page 7, line 3 - page 8, line 4	1,2
A	EP 0 346 639 A (MOTOROLA INC) 20 December 1989 see claims 1,2	1,2

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International Application No

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